

Multiplying With Fractions

Sometimes, instead of adding or subtracting fractions, you need to multiply them. For example, suppose you take inventory at the sporting goods store where you work. There are $13\frac{1}{2}$ boxes of footballs in the stock room, and there are 12 footballs in a full box. How can you find the total number of footballs without opening all the boxes? This situation requires multiplication.

In this investigation, you will relate what you already know about multiplication to situations involving fractions. Remember, to make sense of a situation you can draw a model or change a fraction to an equivalent form. You can also estimate to see if your answer makes sense.

3.1

How Much of the Pan Have We Sold?



TEKS / TAKS

6(11)A Apply mathematics to everyday experiences. 6(11)C Develop an appropriate problem-solving strategy by drawing a picture.

Paulo and Shania work the brownie booth at the school fair. Sometimes, they have to find a fractional part of another fraction.

How much is
 $\frac{1}{3}$ of $\frac{2}{3}$?



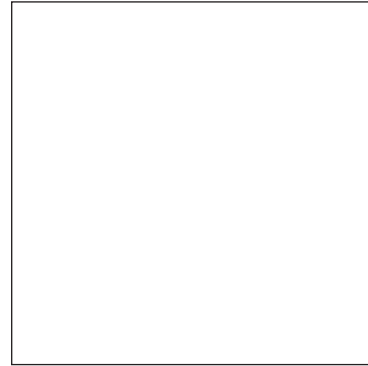
Problem 3.1 A Model for Multiplication

All the pans of brownies are square. A pan of brownies costs \$12. You can buy any fractional part of a pan of brownies and pay that fraction of \$12. For example, $\frac{1}{2}$ of a pan costs $\frac{1}{2}$ of \$12.

A. Mr. Williams asks to buy $\frac{1}{2}$ of a pan that is $\frac{2}{3}$ full.

1. Use a copy of the brownie pan model shown at the right. Draw a picture to show how the brownie pan might look before Mr. Williams buys his brownies.
2. Use a different colored pencil to show the part of the brownies that Mr. Williams buys. Note that Mr. Williams buys *a part of a part* of the brownie pan.
3. What fraction of a whole pan does Mr. Williams buy? What does he pay?

Model of a Brownie Pan



B. Aunt Serena buys $\frac{3}{4}$ of another pan that is half full.

1. Draw a picture to show how the brownie pan might look before Aunt Serena buys her brownies.
2. Use a different colored pencil to show the part of the brownies that Aunt Serena buys.
3. What fraction of a whole pan does Aunt Serena buy? How much did she pay?

C. When mathematicians write $\frac{1}{2}$ of $\frac{1}{4}$, they mean the operation of multiplication, or $\frac{1}{2} \times \frac{1}{4}$. When you multiply a fraction by a fraction, you are finding “a part of a part.” Think of each example below as a brownie-pan problem in which you are buying part of a pan that is partly full—a part of a part.

1. $\frac{1}{3} \times \frac{1}{4}$

2. $\frac{1}{4} \times \frac{2}{3}$

3. $\frac{1}{3} \times \frac{3}{4}$

4. $\frac{3}{4} \times \frac{2}{5}$

D. Use estimation to decide if each product is greater than or less than 1. To help, use the “of” interpretation for multiplication. For example, in part (1), think “ $\frac{5}{6}$ of $\frac{1}{2}$.”

1. $\frac{5}{6} \times \frac{1}{2}$

2. $\frac{5}{6} \times 1$

3. $\frac{5}{6} \times 2$

4. $\frac{3}{7} \times 2$

5. $\frac{3}{4} \times \frac{3}{4}$

6. $\frac{1}{2} \times \frac{9}{3}$

7. $\frac{1}{2} \times \frac{10}{7}$

8. $\frac{9}{10} \times \frac{10}{7}$

ACE Homework starts on page 40.